SPEC® CPU2017 Integer Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

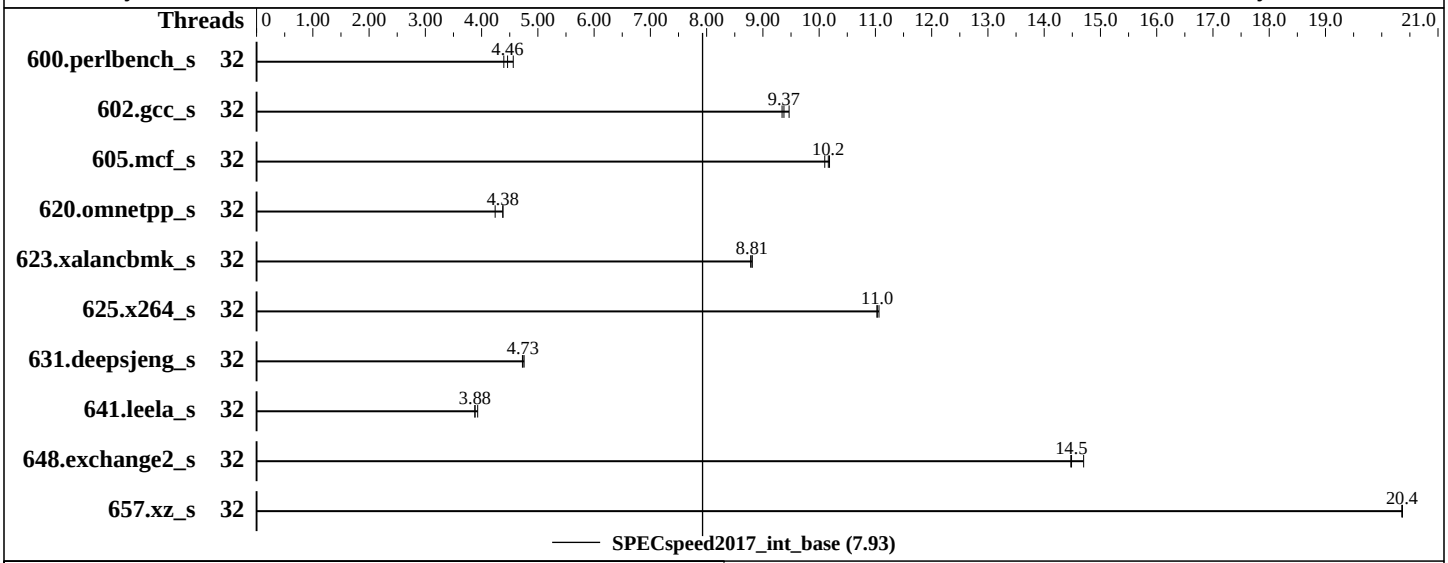
ProLiant DL325 Gen10
(2.35 GHz, AMD EPYC 7452)

SPECspeed2017_int_base = 7.93

SPECspeed2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Jul-2019
Hardware Availability: Aug-2019
Software Availability: Jun-2019



Hardware

CPU Name:	AMD EPYC 7452
Max MHz.:	3350
Nominal:	2350
Enabled:	32 cores, 1 chip
Orderable:	1 chip
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	512 KB I+D on chip per core
L3:	128 MB I+D on chip per chip, 16 MB shared / 4 cores
Other:	None
Memory:	512 GB (8 x 64 GB 4Rx4 PC4-2933Y-L)
Storage:	1 x 400 GB SAS SSD, RAID 0
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 (x86_64) SP1 Kernel 4.12.14-195-default
Compiler:	C/C++: Version 1.3.0 of AOCC Fortran: Version 4.8.2 of GCC
Parallel:	Yes
Firmware:	HPE BIOS Version A41 07/11/2019 released Aug-2019
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	jemalloc: jemalloc memory allocator library V5.1.0;

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	389	4.56	**398**	**4.46**	404	4.39							
602.gcc_s	32	421	9.47	**425**	**9.37**	426	9.34							
605.mcf_s	32	**465**	**10.2**	464	10.2	467	10.1							
620.omnetpp_s	32	385	4.24	**373**	**4.38**	373	4.38							
623.xalancbmk_s	32	**161**	**8.81**	161	8.81	161	8.78							
625.x264_s	32	159	11.1	**160**	**11.0**	160	11.0							
631.deepsjeng_s	32	301	4.76	303	4.73	**303**	**4.73**							
641.leela_s	32	434	3.93	**439**	**3.88**	440	3.88							
648.exchange2_s	32	200	14.7	203	14.5	**203**	**14.5**							
657.xz_s	32	304	20.4	304	20.4	**304**	**20.4**							

SPECspeed2017_int_base = 7.93

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

```
The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

The AOCC Fortran Plugin version 1.3.0 was used to leverage AOCC optimizers
with gfortran. It is available here:
http://developer.amd.com/amd-aocc/
```

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
```

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Operating System Notes (Continued)

```
dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)
```

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc130_naples_A_lib/64;
/home/cpu2017/amd_speed_aocc130_naples_A_lib/32:"
OMP_DYNAMIC = "false"
OMP_PLACES = "cores"
OMP_PROC_BIND = "close"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "192M"
OMP_WAIT_POLICY = "active"

Binaries were compiled on a system with 2p AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
jemalloc: configured and built with GCC v4.8.5 in RHEL v7.2 under default conditions.
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2
```

Platform Notes

```
BIOS Configuration
 Thermal Configuration set to Maximum Cooling
 AMD SMT Option set to Disabled
 Determinism Control set to Manual
 Performance Determinism set to Power Deterministic
 Minimum Processor Idle Power Core C-State set to C6 State
 Memory Patrol Scrubbing set to Disabled
 Workload Profile set to General Peak Frequency Compute
 NUMA memory domains per socket set to Four memory domains per socket
 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-20xx Thu Jul 18 12:19:50 2019

 SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo
```

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Platform Notes (Continued)

```
From /proc/cpuinfo
   model name : AMD EPYC 7452 32-Core Processor
      1  "physical id"s (chips)
      32 "processors"
   cores, siblings (Caution: counting these is hw and system dependent. The following
   excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
      cpu cores : 32
      siblings  : 32
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
      25 26 27 28 29 30 31

From lscpu:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
     Address sizes:       48 bits physical, 48 bits virtual
     CPU(s):              32
     On-line CPU(s) list: 0-31
     Thread(s) per core:  1
     Core(s) per socket:  32
     Socket(s):           1
     NUMA node(s):        4
     Vendor ID:           AuthenticAMD
     CPU family:          23
     Model:               49
     Model name:          AMD EPYC 7452 32-Core Processor
     Stepping:            0
     CPU MHz:             2350.000
     CPU max MHz:         2350.0000
     CPU min MHz:         1500.0000
     BogoMIPS:            4691.38
     Virtualization:      AMD-V
     L1d cache:           32K
     L1i cache:           32K
     L2 cache:            512K
     L3 cache:            16384K
     NUMA node0 CPU(s):   0-7
     NUMA node1 CPU(s):   8-15
     NUMA node2 CPU(s):   16-23
     NUMA node3 CPU(s):   24-31
     Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
     pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
     constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
     pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
     rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
     osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx cpb
```

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Platform Notes (Continued)

```
      cat_l3 cdp_l3 hw_pstate ssbd ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2
      cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves
      cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr arat npt
      lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
      pfthreshold avic v_vmsave_vmload vgif umip rdpid overflow_recov succor smca

 /proc/cpuinfo cache data
    cache size : 512 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0 1 2 3 4 5 6 7
   node 0 size: 128804 MB
   node 0 free: 128624 MB
   node 1 cpus: 8 9 10 11 12 13 14 15
   node 1 size: 129021 MB
   node 1 free: 128887 MB
   node 2 cpus: 16 17 18 19 20 21 22 23
   node 2 size: 128992 MB
   node 2 free: 128766 MB
   node 3 cpus: 24 25 26 27 28 29 30 31
   node 3 size: 129009 MB
   node 3 free: 128864 MB
   node distances:
   node   0   1   2   3
     0:  10  12  12  12
     1:  12  10  12  12
     2:  12  12  10  12
     3:  12  12  12  10

 From /proc/meminfo
    MemTotal:       528207724 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="SLES"
       VERSION="15-SP1"
       VERSION_ID="15.1"
       PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

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Platform Notes (Continued)

```
 uname -a:
    Linux linux-20xx 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2017-5754 (Meltdown):          Not affected
 CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
 CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional,
 IBRS_FW, STIBP: disabled, RSB filling

 run-level 3 Jul 18 12:17

 SPEC is set to: /home/cpu2017
    Filesystem     Type   Size  Used Avail Use% Mounted on
    /dev/nvme0n1p1 btrfs  373G   24G  349G   7% /home

 Additional information from dmidecode follows.  WARNING: Use caution when you interpret
 this section. The 'dmidecode' program reads system data which is "intended to allow
 hardware to be accurately determined", but the intent may not be met, as there are
 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
   BIOS HPE A41 07/11/2019
   Memory:
    8x HPE P03054-091 64 GB 4 rank 2933
    8x UNKNOWN NOT AVAILABLE

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
 CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base)
      657.xz_s(base)
------------------------------------------------------------------------------
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
  AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin
------------------------------------------------------------------------------

==============================================================================
 CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
      641.leela_s(base)
------------------------------------------------------------------------------
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
```

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Compiler Version Notes (Continued)

```
  AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin
------------------------------------------------------------------------------

==============================================================================
 FC  648.exchange2_s(base)
------------------------------------------------------------------------------
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
clang gfortran

Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -ffast-math
-march=znver1 -mno-avx2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -inline-threshold=1000
-flv-function-specialization -mllvm  -enable-gvn-hoist
-mllvm -function-specialize -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lamdlibm
```

C++ benchmarks:
```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -march=znver1
-mllvm -unroll-threshold=100 -finline-aggressive -fremap-arrays
-mllvm -inline-threshold=1000 -mllvm -enable-vectorize-compares=false
-z muldefs -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread
-ldl -ljemalloc -lamdlibm
```

Fortran benchmarks:
```
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -Wl,-mllvm -Wl,-merge-constant
-Wl,-mllvm -Wl,-unroll-aggressive -Wl,-mllvm -Wl,-unroll-threshold=150
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -mavx -madx
-funroll-loops -ffast-math -frepack-arrays -z muldefs
-fplugin=dragonegg.so -specs=integrated-as.specs
-fplugin-arg-dragonegg-llvm-option=-disable-indvar-simplify
-fplugin-arg-dragonegg-llvm-option=-unroll-aggressive
-fplugin-arg-dragonegg-llvm-option=-unroll-threshold:150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lamdlibm
-lgfortran
```

Base Other Flags

C benchmarks:
```
-Wno-return-type -DUSE_OPENMP
```

C++ benchmarks:
```
-Wno-return-type -DUSE_OPENMP
```

Fortran benchmarks:
```
-DUSE_OPENMP -Wno-return-type
```

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/aocc130-flags-revA-I.html
http://www.spec.org/cpu2017/flags/gcc.2017-11-20.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revE.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/aocc130-flags-revA-I.xml
http://www.spec.org/cpu2017/flags/gcc.2017-11-20.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revE.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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